Listing of Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (original) A method of printing on substrate comprising the steps of:

moving a print head carriage, having at least one ink jet nozzle thereon, parallel to a plane in which is supported a substrate having a surface that is at a nonuniform location relative to said plane;

adjusting the distance from the nozzle to the plane to position the nozzle at a predetermined distance from the surface of the substrate where ink is to be jetted from the nozzle;

jetting ink from the nozzle across the predetermined distance onto the surface of a substrate.

2. (original) The method of claim **1** wherein:

the ink is UV curable ink;

the method further comprises the step of at least partially curing the ink jetted onto the surface by exposing the jetted ink to ultraviolet light.

3. (original) The method of claim **1** further comprising the steps of:

sensing the position of the surface of the substrate relative to the carriage; and

the adjusting of the distance from the nozzle to the plane is performed in response to said sensing.

4. (original) The method of claim **1** wherein:

the sensing of the positions is carried out while moving the print head carriage; and

the adjusting includes varying the position of the nozzle relative to the plane as the print head carriage moves so as to maintain the predetermined distance across the substrate in response to the sensed distance.

5. (original) A method of printing on rigid panels comprising the steps of:

moving parallel to a rigid panel a print head carriage having an ink jet nozzle thereon directed toward a surface of the panel;

automatically adjusting the distance of the nozzle from the panel to maintain a predetermined distance between the nozzle and the surface of the panel at the location onto which ink is to be jetted from the nozzle; and

while moving the print head carriage, jetting ink from the nozzle across the predetermined distance and onto the surface of the rigid panel.

6. (original) The method of claim **5** wherein:

the surface of the panel onto which the ink is jetted varies across the panel in its distance from the carriage; and

the adjusting includes varying the position of the nozzle relative to the panel as the print head is moved to maintain the predetermined spacing between the nozzle and the location on the surface at which the ink is jetted.

7. (original) The method of claim **6** further comprising the step of:

sensing the distance between the print head carriage and locations on the surface at which ink is to be jetted; and

varying the position of the nozzle relative to the print head carriage in response to the sensed distance.

8. (original) The method of claim **6** further comprising the step of:

sensing the contour of the surface of the panel; and

moving the carriage parallel to the panel to locations determined in response to the sensed contour and jetting the ink onto the surface of the panel at said locations.

9. (original) The method of claim **5** wherein:

the ink is UV curable ink;

the method further comprises the step of at least partially curing the ink jetted onto the surface by exposing the jetted ink to ultraviolet light.

10. (original) An apparatus for printing on a surface of a three-dimensional substrate comprising:

a frame having a substrate support mounted thereon defining a substrate supporting plane and a print head track extending parallel to the plane;

at least one ink jet print head having at least one nozzle thereon and moveably supported on the track with the nozzle directed toward the surface of a substrate supported by the substrate support;

a sensor operable to determine a distance therefrom of a portion of the surface; and

the nozzle being moveable perpendicular to the plane in response to the sensor to a predetermined distance from the surface of the substrate; and

a controller operable to move and control the nozzle to print on the substrate by jetting ink from the nozzle across the predetermined distance and onto the surface of a substrate.

11. (original) The apparatus of claim **10** further comprising:

a UV light curing head on the frame and positioned so as to expose ink jetted onto the surface of a substrate by the print head to UV light;

the UV light curing head is moveable perpendicular to the plane; and

the controller is operable to move the curing head to maintain focus of UV light from the print head on ink jetted onto the surface of the substrate.

12. (original) The apparatus of claim **10** wherein:

the sensor is a non-contact, distance measuring device that includes a light source and light detector mounted on the track.

13. (original) The apparatus of claim **10** wherein:

the sensor is a non-contact, distance measuring device that includes a light source and light detector mounted on the track; and

the track has further mounted thereon a servo motor responsive to an output signal from the sensor to adjust the position of the nozzle.

14. (original) The apparatus of claim **10** wherein:

the sensor includes moveable mechanical elements that maintain contact with the surface of the substrate; and

the nozzle is linked to the mechanical elements so as to move in response thereto.

15.(currently amended) A system for printing images on a substrate, comprising:

a multiplicity of print heads mounted in a carriage, the print heads being positioned a distance from the substrate;

a sensor which detects the ~~thickness~~ position of the surface of the substrate; and

a control system which receives the ~~substrate thickness~~ information detected by the sensor and transmits signals to a motor coupled to the carriage, the transmitted signals instructing the motor to adjust the position of the ~~carriage~~ print heads to maintain a desired gap between the print heads and the substrate.

16. (original) The system of claim **15**, wherein the control system includes a controller which transmits the signals to the motor.

17. (currently amended) The system of claim **16**, wherein the controller is coupled to a CPU which receives ~~a substrate thickness~~ information ~~signal from~~ detected by the sensor, processes the information, and transmits signals to the controller to instruct the motor to adjust the position of the ~~carriage~~ print heads to maintain the desired gap.

18. (currently amended) The system ~~of claim~~ of claim **16**, wherein the control system includes a feedback device which senses the gap between the print heads and the substrate, the gap information being relayed to the controller such that the controller can further instruct the motor to alter the position of the print heads relative to the substrate to achieve the desired gap.

19. (currently amended) The system of claim **18**, wherein the feedback device transmits the gap information to a CPU which ~~process~~ processes the information and relays the processed gap information to the controller.

20. (original) The system of claim **15**, wherein the motor is a servo motor.

Claims **21-23** (canceled)

24. (original) The system of claim **15**, wherein the sensor includes an indicator roller.

Claim **25** (canceled)

26.(currently amended) The system of any of claims **15** through **[[25]] 20** further comprising a table adapted to support the substrate, including flexible and non-flexible substrates.

27.(currently amended) The system of claim **26**, wherein the sensor detects the ~~thickness~~ position of the surface of the substrate as the substrate moves through the system.

28. (currently amended) The system of any of claims **15** through **[[25]]** 20 wherein the sensor detects the ~~thickness~~ position of the surface of the substrate as the substrate moves through the system.

Claims **29-30** (canceled)

31. (original) The system of claim **15**, wherein the sensor is mounted in the carriage.

32. (original) The system of claim **15**, wherein the sensor includes two sensors mounted in the carriage.

33. (original) The system of claim **15**, wherein:

the print heads are bidirectional print heads that print while moving transversely across a substrate that is moveable longitudinally relative to the print heads,

the sensor includes two sensors mounted in the carriage transversely of the print heads, one on each side of the print heads.

34.(currently amended) A method for controlling the distance between print heads of a printing system and a substrate, comprising:

moving the substrate relative to the print heads;

detecting the ~~thickness~~ position of the surface of the substrate while the substrate moves relative to the print heads;

transmitting ~~the thickness~~ information of the position of the surface of the substrate to a controller;

transmitting height adjustment information signals from the controller to a motor coupled to a carriage which holds the print heads; and

adjusting the position of the ~~carriage~~ print heads with the motor to maintain a desired gap between the print heads and the substrate.

35.(currently amended) The method of claim **34**, ~~further comprising~~ wherein the detecting of the position of the surface of the substrate includes detecting the distance between the print heads and the substrate.

36. (original) The method of claim **35**, further comprising transmitting the distance information to the controller and re-adjusting the position of the print heads based on the distance information detected.

Claim **37** (canceled)

38. (currently amended) The method of any of claims **34** through **[[37]]** **36** further comprising:

positioning a substrate on a table adapted to support flexible and non-flexible substrates.

Claims **39-40** (canceled)

41. (original) The method of claim **34**, wherein:

the moving of the substrate includes moving the substrate longitudinally relative to the printheads;

the method further comprises moving the print heads transversely on a carriage relative to the substrate; and

the transmitting of the thickness information includes transmitting the information from a sensor on the carriage.

42. (original) The method of claim **41** wherein:

the transmitting of the thickness information includes transmitting the information from at least one of at least two sensors mounted on the carriage.

Claims **43-49** (canceled)

50. (new) The system of claim **15** wherein:

the signals instruct the motor to adjust the position of the print heads by adjusting the position of the carriage relative to the substrate to maintain the desired gap between the print heads and the substrate.

51. (new) The system of claim **15** wherein:

the signals instruct the motor to adjust the position of the print heads by adjusting the position of the print heads relative to the carriage to maintain the desired gap between the print heads and the substrate.

52. (new) The method of claim **34**, wherein:

the signals instruct the motor to adjust the position of the print heads by adjusting the position of the carriage relative to the substrate to maintain the desired gap between the print heads and the substrate.

53. (new) The method of claim **34**, wherein:

the signals instruct the motor to adjust the position of the print heads by adjusting the position of the print heads relative to the carriage to maintain the desired gap between the print heads and the substrate.

Remarks

Species 2 is elected, which includes the embodiment of Fig. 2A.

The claims are readable on the disclosure as follows:

Generic: Independent claims 1, 5 and 10. Applicant submits that dependent claims 2-4, 6-9 and 11 are also generic, in that Figs. 2 and 2A both are embodiments of Fig. 1, which as described in the specification include the other elements of these claims.

The generic claims plus claims 12-13 and 15-20, 24, 26-28, 31-36, 38, 41-42 and 50-54 read on Species 2 (Fig. 2A).

The generic claims plus claim 14 reads on Species 1 (Fig. 2).

Respectfully submitted,

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